known by their true scientific names. This is the case with Eschscholtzia, Romneya, Clematis, Isomeris, Silena, Malva, Ceanothus, Hosackia, Ribes, Phacelia, Gilia, and many others for which the generic name has become a popular name.

This is owing to various causes, one being the difficulty of applying the old familiar garden names; which are used, however, when any resemblance can be traced, as is the case with larkspur, honeysuckle, columbine, etc. Many of the settlers have also become familiar with the true names of these flowers by having received them from parties that have introduced them to cultivation, for which the greatest credit is due to the late James Vick.

Many visitors, as well as settlers, seek to learn the names of the many strange and beautiful flowers, that, by massing, become such a feature in the scenery, and find the 'dry' scientific names as easy to learn, and as sensible, as the old Spanish names, but few of which survive in the popular mind. Thanks to the little botany of Volney Rattan, largely supplemented by visiting and amateur botanists, all are enabled to learn the more common species with comparative ease. C. R. ORCUTT.

### The use of the method of rates in mathematical teaching.

In the case of the question, "Does change in the rate of motion take place at an instant, or during an interval?" I am surprised to find that Professor Wood (*Science*, May 16) regards my amendment as only increasing the difficulty. It may be that I have been misunderstood: permit me, therefore, to answer the questions which the professor goes on to ask in illustration of this difficulty. Assuming (of course, correctly) that my answer to the question is, that it takes time to produce a change in the rate of motion, he asks, "How long is this interval?" I answer, "As long as you please usually: of course, the longer the interval, the greater the change." — "If ever so small, is the rate variable during the interval?" — "Certainly." — "If variable, the original question arises, and we wish to know if *change* involves *a part* of the interval." — "Of course, a part of the change takes place in a part of the interval, and the rest of the change takes place in the rest of the interval." — "Does change in the rate take place at 'a point' in the path, or during 'a space' of the path?" — "During 'a space' of the path; that is, while the point is passing over a space of the path." — "If at 'a point,' is it not equivalent to asserting that a change takes place in no time? [Most certainly it would be, but we do not assert this at all.] And if an interval is necessary, must it not be conceived as infinitesimal?" — "By no means: if you want a finite change, and that is what is usually meant by a change, you must take a finite interval of time; but, if you insist on introducing the conception of an infinitesimal change, you must admit also an infinitesimal interval of time." Let us put precisely parallel questions with respect to the *position* of a moving point. Does change of position take place at an instant, or during an interval? During an interval. How long is this interval? That depends upon the amount of change of position you desire to produce. If ever so small, is the position of the point variable during the interval? Certainly, if the point moves. Does change of position take place at a point in the path? Certainly not: a point has position, but no magnitude.

If there is any difficulty in conceiving the velocity of a point to be continuously variable, there is precisely the same difficulty in conceiving the abscissa of a point moving on the axis of $x$ to be continuously variable; in other words, in conceiving the possibility of motion itself. It should be remembered that the definition of the measure of a variable velocity, presupposed in this discussion, is simply that which we find in such treatises as Tait and Steel's Dynamics of a particle: "Velocity is said to be variable when the moving point does not describe equal spaces in equal times. *The velocity at any instant is then measured by the space which would have been described in a unit of time, if the point had moved on uniformly for that interval with the velocity which it had at the instant contemplated.*" WM. WOOLSEY JOHNSON.

Annapolis, May 19.

### Pleuracanthus and Didymodus.

In your issue of April 11, my friend Professor Gill communicates his views on the relationships of Pleuracanthus and Chlamydoselachus, and endeavors to correct some of my opinions and statements. On some points I stand corrected, thanks to Professor Gill's superior knowledge of the literature of the subject. However, as Professor Gill has not seen my material, nor the paper which I read before the Philosophical society upon it, I may, in turn, enlighten him on some important aspects of the case.

Professor Gill objects to the identification of the genera Didymodus and Chlamydoselachus on the sole ground of the diversity in the form of the teeth. He probably has other reasons for objecting; but, with his usual magnanimity, he has not used his most effective weapons. He doubts the pertinence of the recent and extinct genera to the same order. He points out that the oldest name of the genus called Diplodus is Pleuracanthus, and that my order Ichthyotomi has been already defined and named by Lütken as the Xenacanthini.

On these positions, I make the following comments:—

1. There is no generic difference to be detected, in my opinion, between the teeth which are typical of Diplodus Agass. and Thrinacodus St. J. and W. and the recent Chlamydoselachus. Differences there are, but apparently not of generic value. The identification of the recent and extinct genera rests, as far as this point goes, on the same basis as that of the recent and extinct Ceratodus.

2. At the time of my proposal of the name Didymodus, I was not convinced that fishes of this type bore the spines referred to the genus Pleuracanthus Agass. None of the authors cited figure any specimens which present both tricuspidate teeth and a nuchal spine. None of my ten specimens possess a spine. However, Kner describes two specimens as exhibiting both tricuspidate teeth and a spine, and Sir P. Egerton's statements (*l.c.*) on this point are positive. So we must regard Pleuracanthus as the name of this genus, with Diplodus as a synonyme.

3. Diplodus being regarded as a synonyme of Pleuracanthus, it follows that Chlamydoselachus Garm. is distinct on account of the *different structure of the dorsal fin*, which is single and elongate in Pleuracanthus, according to Geinitz and Kner. The presence of the nuchal spine in Pleuracanthus is also, probably, a character of distinction, although we do not yet know whether such a spine is concealed in Chlamydoselachus or not.

4. The identity of Didymodus (type, Diplodus compressus Newberry) and Pleuracanthus may now be questioned. None of the specimens are figured and described by the authors above cited, as displaying an occipital condyle, or posterior frontal cornua. My specimens of Didymodus compressus do not exhibit

teeth on the roof of the mouth, as Kner describes. There are no spines with the crania, although separate Pleuracanthus spines are not rare in the same beds. The teeth associated with the skulls, moreover, present a button on the superior side of the root. Agassiz figures teeth of this kind as belonging to the Diplodus gibbosus. St. John and Worthen make these teeth typical of Diplodus, and confer the name Thrinacodus on those without the button. The button is, however, probably only a specific character. The latter name is, then, probably a synonyme of Pleuracanthus. The button-bearing teeth are figured and described by Kner as occurring scattered, and at a somewhat different horizon from that of the Pleuracanthus specimens. In Germany, as in Texas, the button-bearing teeth are the larger. I suspect that the skulls I describe represent a different genus from Pleuracanthus proper. This genus will not differ from Chlamydoselachus Garm., so far as we know the latter; but the button indicates another species.

5. Of course, a study of the anatomy of Chlamydoselachus, which I hope Mr. Garman may soon give us, may reveal differences between that genus and Didymodus; but of these we know nothing as yet.

6. The order Xenacanthini was proposed by Geinitz (Dyas) for Pleuracanthus on account of the supposed suctorial character of the ventral fins. This character is supposed by Kner to be sexual. In any case, this division, whatever its value, must be subordinated to the order Ichthyotomi, as I define it.

E. D. COPE.

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## *THE GOVERNMENT, AND ECONOMIC ENTOMOLOGY.*

A FOURTH bulletin of the entomological division of the department of agriculture has just appeared, containing four reports, either by persons not closely connected with the department, or by its *attachés* sent on special missions, together with extracts from the miscellaneous correspondence of the division. The latter is of variable and generally insignificant value, and would have better been printed in small type: it might have been further curtailed by the omission of some absolutely worthless verbiage, though we recognize that less extraneous matter appears than has been customary in the reproduction of similar correspondence in the annual reports. Of the special reports, the most valuable is that of Mr. J. B. Smith on hop and cranberry insects, of which he mentions seven or eight species as attacking each plant. The least valuable is Mr. Branner's report of his mission to Brazil in the interest of the division. Being, apparently, only a temporary document, and valuable almost entirely for departmental purposes, it was quite unnecessary to publish it: on the other hand, if this is all that is to appear, his expedition must be deemed a failure.

The issue of these bulletins — an innovation in the practice of the department — indicates a laudable intention, on the part of the commissioner, to publish with promptness reports of its special agents upon particular topics. Since this cannot fail to stimulate those engaged in its work, and to enhance the value of the division in the eyes of our large agricultural population, it deserves commendation. We venture to suggest that the plan could be improved by issuing the bulletin at stated intervals, and making it a periodical, to which contributions from all quarters should be invited. All the entomologists of the country might thus become collaborators of the department without further cost to the treasury than the publication of the results of their researches: it would prove a credit to the bureau, a vast encouragement to economic entomology, and a boon to our agriculturists. The former experience of the present head of the division renders him an eminently fit person under whom to inaugurate such a plan.

In few countries in the world would such a plan be more desirable, more advantageous, or more likely to succeed. Covering, as our country does, a wide extent of fertile territory subject to most varied climatic conditions, and hence embracing unusual diversity of economic problems, our people are at the same time extremely ready to contribute their knowledge or experience, without compensation, for the public weal. Americans are not always anxious for precedents; yet, if precedent is demanded, the *Annales de la science agronomique* (just published under the auspices of the minister of agriculture), the various reviews, such as the *Revue des sociétés savantes* and the *Bibliothèque de l'école des hautes études* (long published by the minister of public instruction), together with the *Revue maritime et coloniale* (issued under the direction of the minister of marine), show what France alone has done, in similar ways, for science and industry during the past twenty-five years. It is time our government supported similar aids to material and intellectual growth.

In harmony with this plan, a further extension of the work of the division would prove desirable. Why would it not be feasible to district the country (omitting the sterile portions) into, say, half a dozen great areas, based on the geographical distribution of the main agricultural products and on climatological factors, and permanently locate, at some convenient centre in each, skilful assistants of the division to study *on the spot* the history and devastations of noxious insects? It is as impossible to do this work at Washington as to do that of the coast-survey or the geological survey, each of which has permanent establish-